I microRNA circolanti come biomarcatori della fisiologia dell'astronauta, lo studio degli effetti delle condizioni ambientali spaziali, prevenzione e diagnosi di patologie

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Ministero della Salute

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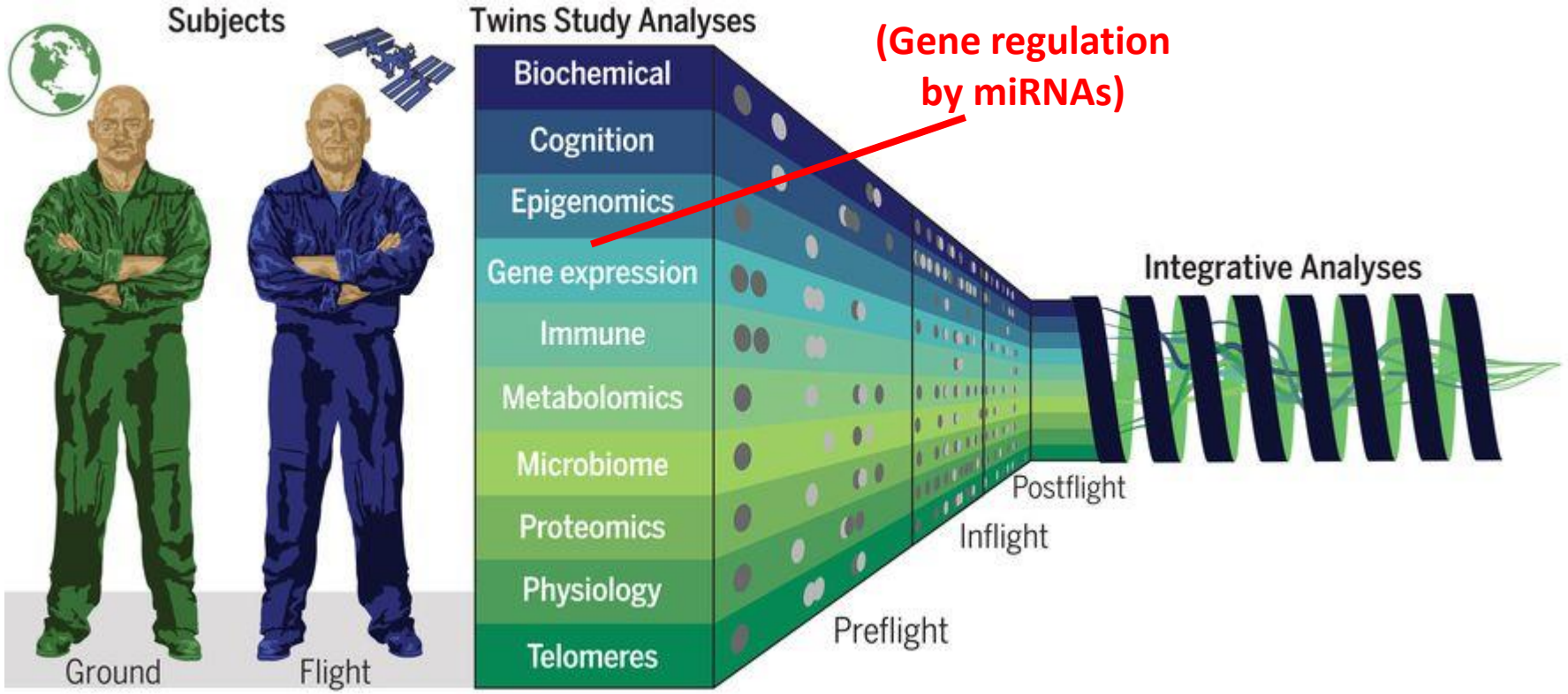
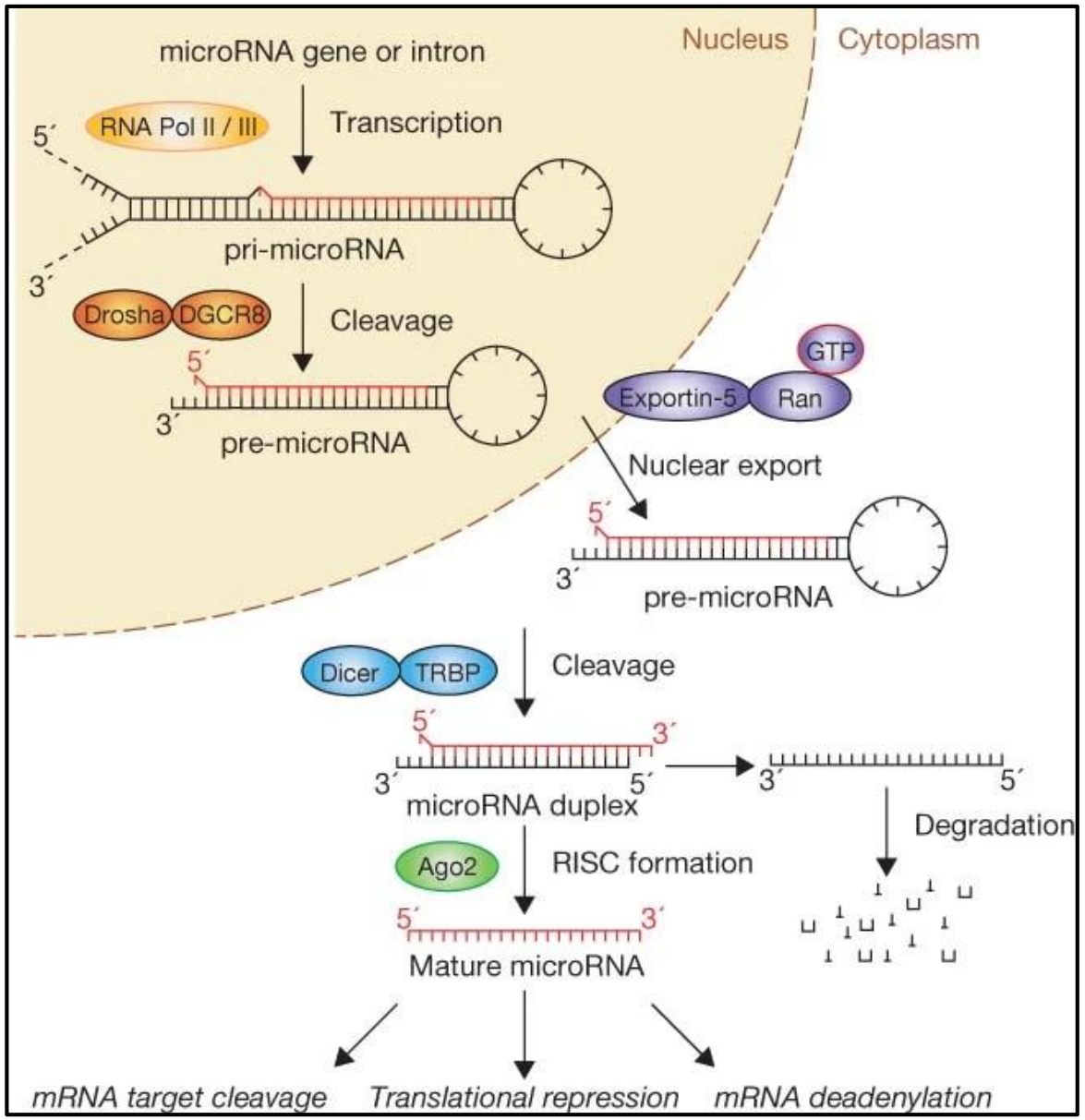
The NASA Twins Study

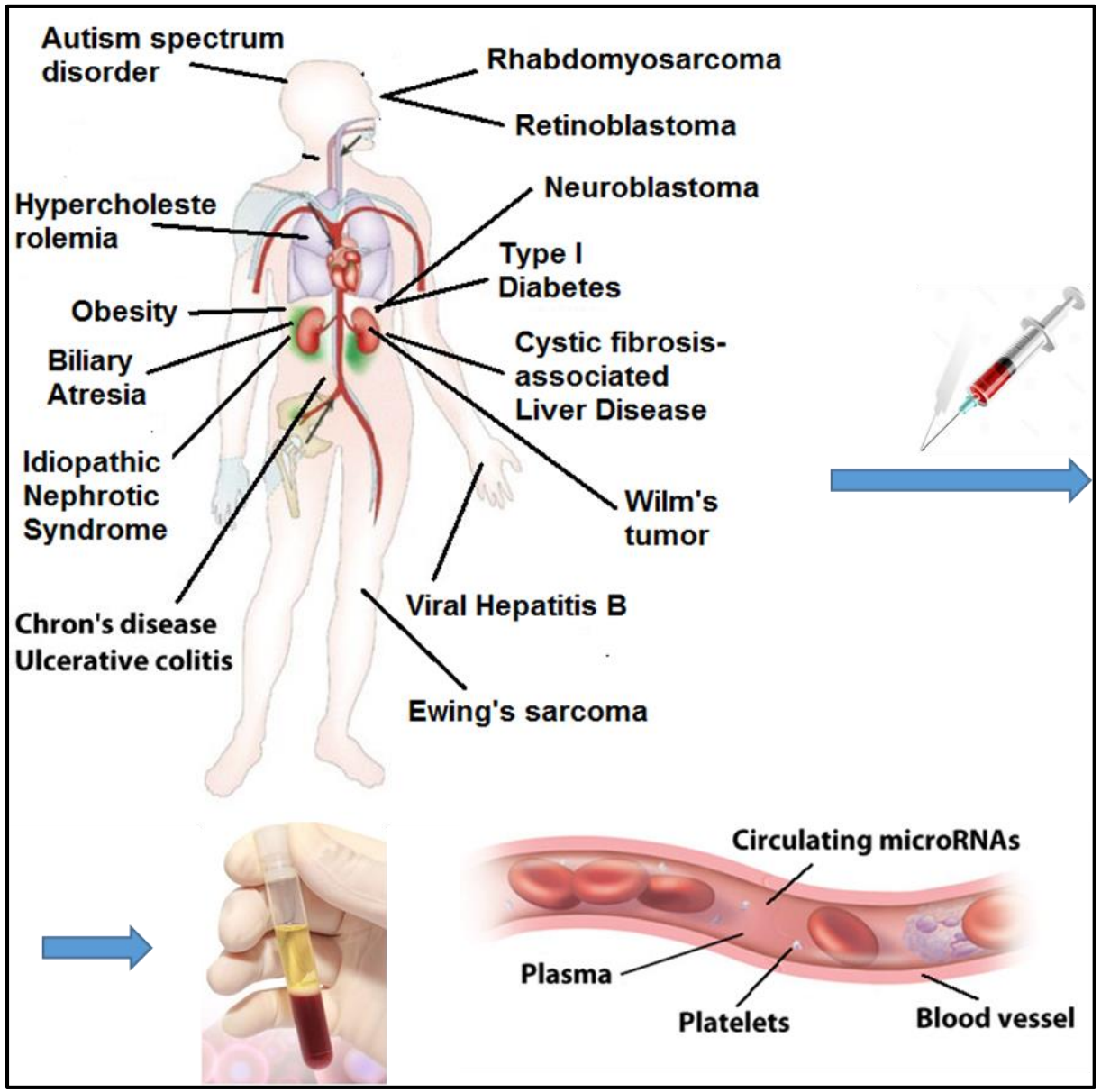
The identical *twin* astronauts Scott and Mark Kelly



Garrett-Bakelman FE, et al. The NASA Twins Study: A multidimensional analysis of a year-long human spaceflight. Science. 2019 Apr 12;364(6436):eaau8650.

The microRNA world

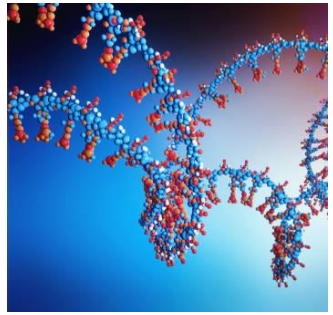




"Liquid biopsies" (i.e., Exosomes, cDNA, cRNA, etc.)

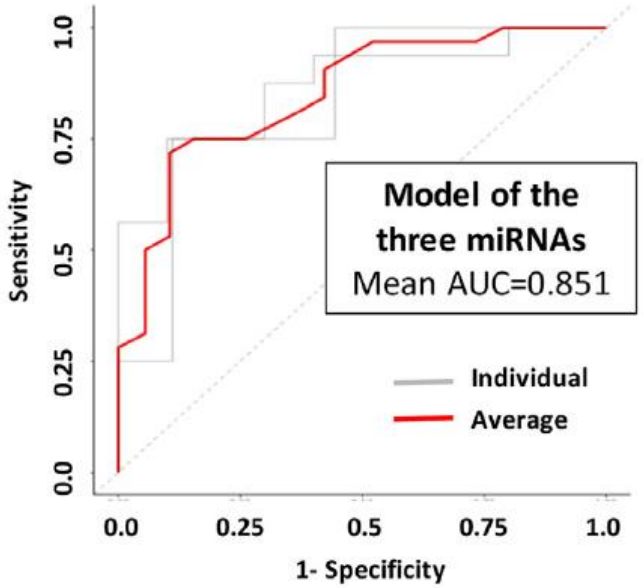
Patients' recruitment

Blood samples



miRNA extraction

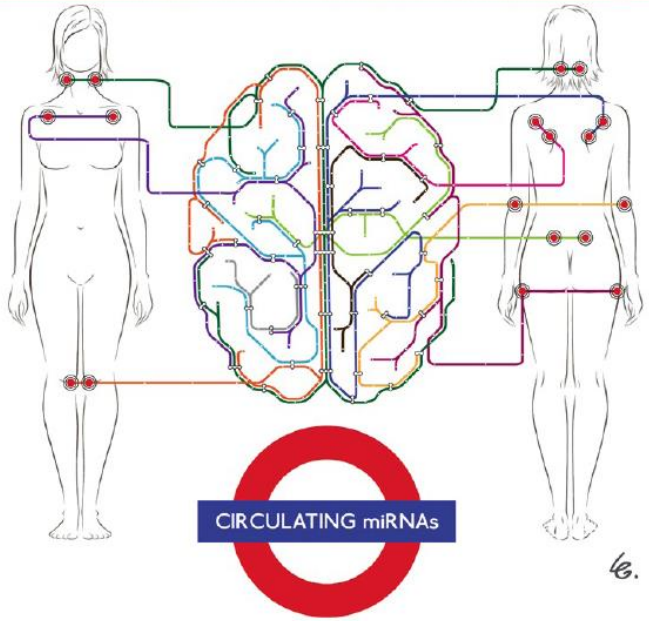
Quantification



Fibromialgia and Insulin resistance in Obese patients

Circulating microRNA Profiles as Liquid Biopsies for the Characterization and Diagnosis of Fibromyalgia Syndrome

MOLECULAR NEUROBIOLOGY
Volume 54 • Number 9 November 2017



Fibromyalgia and Circulating microRNAs

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PEDIATRIC OBESITY
ORIGINAL RESEARCH doi:10.1111/ijpo.12133

Oral glucose tolerance test unravels circulating miRNAs associated with insulin resistance in obese preschoolers

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Summary

Background: Circulating microRNAs (miRNAs) may act as biomarkers of metabolic disturbances.

Objective: The aim of this study was to identify serum miRNAs signature of early insulin resistance in obese preschoolers.

ORIGINAL RESEARCH

Celiac disease and adherence to gluten-free diet

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(54) Title: CIRCULATING MICRO-RNAS AS BIOMARKERS FOR THE DIAGNOSIS OF CELIAC DISEASE AND FOR MONITORING ADHERENCE TO A GLUTEN-FREE DIET

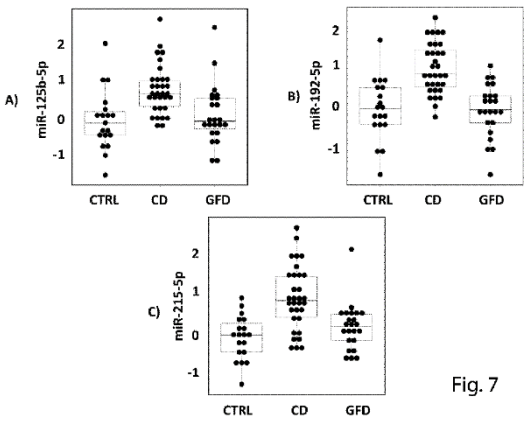

Fig. 7

(57) Abstract: The present invention relates to the use of circulating microRNAs as biomarkers for the non-invasive diagnosis of celiac disease and for monitoring adherence to a gluten-free diet and associated methods.

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Circulating microRNAs as novel non-invasive biomarkers of paediatric celiac disease and adherence to gluten-free diet

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Summary

Background Celiac Disease (CD) is a multifactorial autoimmune enteropathy (with a prevalence of approximately 1% worldwide) that exhibits a wide spectrum of clinical, serological and histological manifestations. For the diagnosis of paediatric CD, the gold standard is the combination of serological tests (with high TGA-IgA values greater than 10 times the upper limit of normal) and duodenal biopsy (with a positive TGA-IgA but low titer). Therefore, a diagnostic test that totally excludes an invasive approach has not been discovered so far and the discovery of novel biological markers would represent an undoubted advantage for the diagnosis of CD and prognostic evaluation. MicroRNAs (miRNAs), small non-coding RNAs (18–22 nucleotides) that regulate gene expression at post-transcriptional level and play important roles in many biological processes, represent a novel class of potential disease biomarkers. Their presence in biological fluids (i.e., serum, plasma, saliva, urine) provides the opportunity to employ circulating miRNAs as novel non-invasive biomarkers.

Methods In our prospective observational study, we examined the expression of circulating miRNAs in a cohort of CD patients (both at diagnosis and on gluten-free diet, respectively referred as CD and GFD) compared to healthy controls. By small RNA-Seq we discovered a set of circulating miRNAs that were further validated by qPCR with specific assays.

Findings We found that out of the 13 miRNAs able to discriminate the three groups (i.e., CD, GFD and controls), three of them, namely miR-192-5p, miR-215-5p and miR-125b-5p (alone or in combination), were able to discriminate these three groups with high accuracy and specificity.

Interpretation Our conclusions emphasize that these circulating miRNAs can be employed not only for the diagnosis of CD patients with a low TGA-IgA titer but also to monitor the adherence to a gluten-free diet by CD patients. In conclusion, we suggest the use of the circulating miRNAs identified in this work as a novel diagnostic and follow-up tool for paediatric CD.

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Introduction

Celiac Disease (CD) is an autoimmune enteropathy distributed worldwide with a prevalence of approximately 1%.[1] Celiac disease is multifactorial and exhibits a wide

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The Market of Liquid Biopsies

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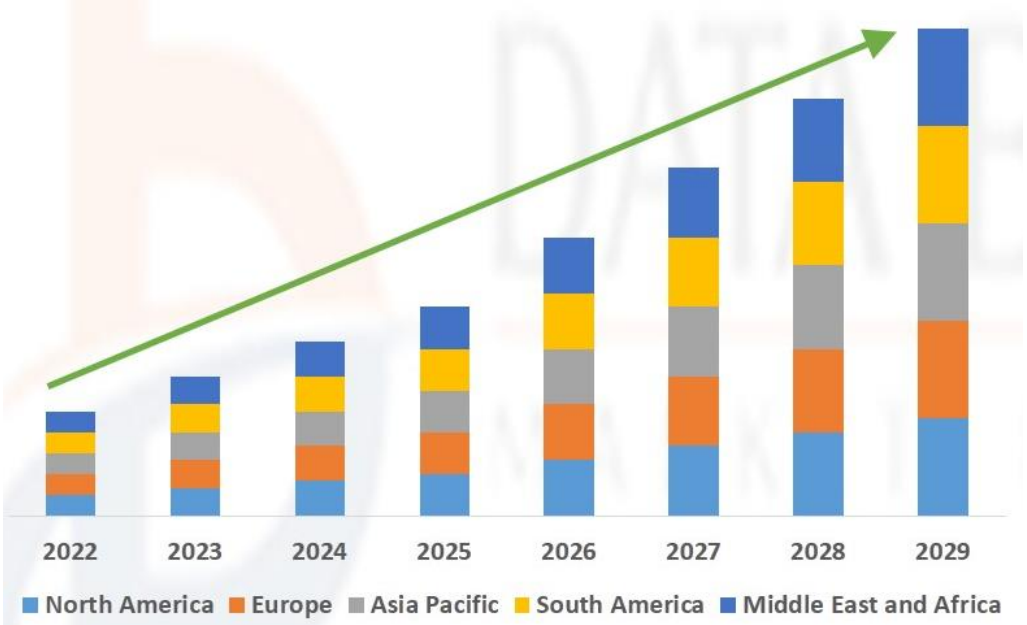
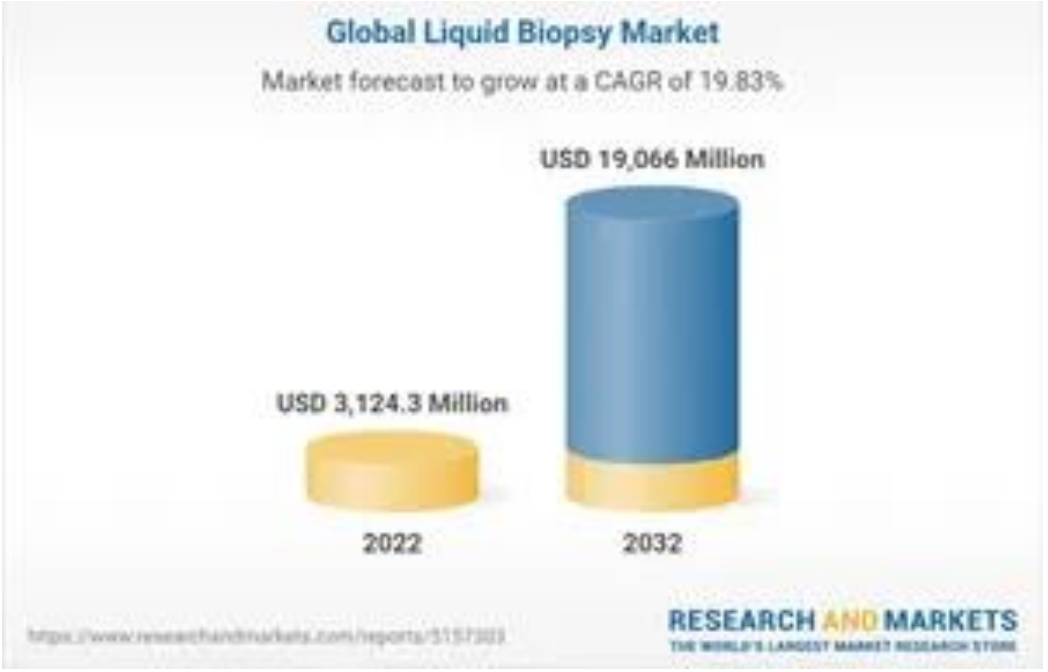
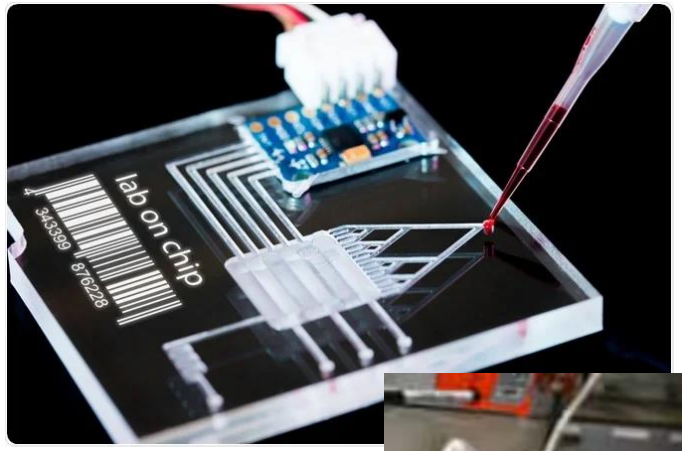
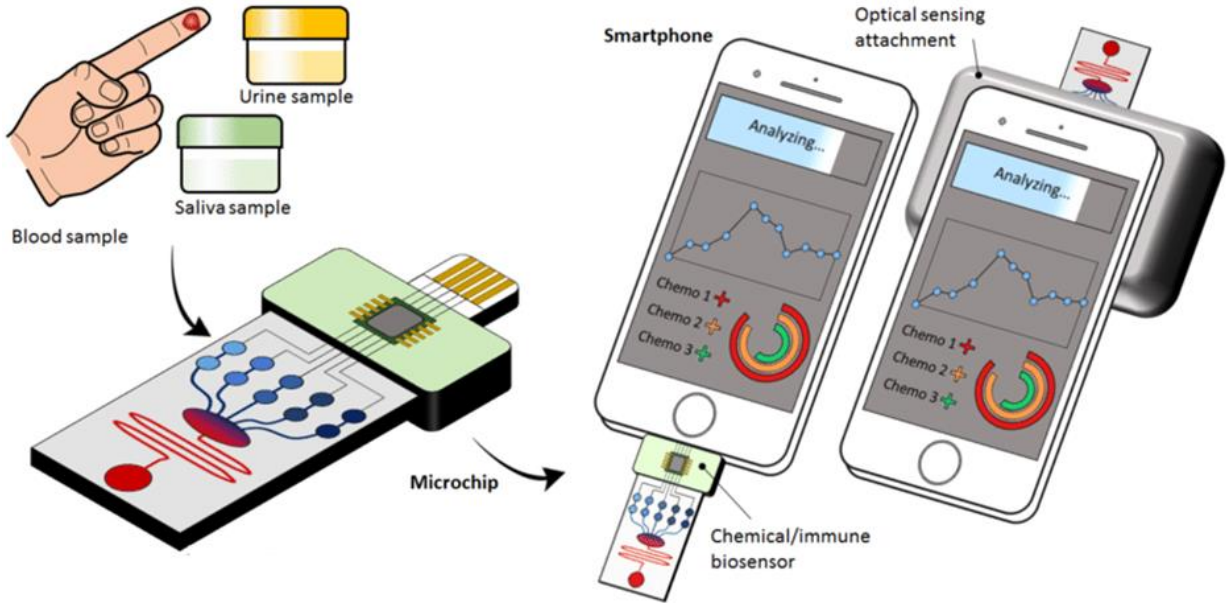




Perspectives





The astronaut Samantha Cristoforetti collects a single biological sample, which could be blood, saliva or urine, on a nanostrip. The strip is inserted into the device. (Image Source : NASA)

Opportunities

Validation of the diagnostic test on 1200 patients → **Funds (public)**
Assessing the methodology using different biological fluids (i.e., urine, feces, sweat, tears)

Development of:

- a commercial IVD kit
- a kit for other techniques (i.e. cytofluorimetry)
- a kit for portable qPCR machine →

} **Industrial partnership**
Funds
Licencing

- Prototyping (i.e., microfluidic/miniaturization) → **Industrial partnership**
Funds

Thank you for your attention

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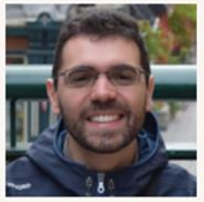

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